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Gerhard K. Heilig
International Institute for Applied Systems Analysis
Laxenburg, Austria

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International Institute for Applied Systems Analysis, Laxenburg, Austria
Tel: +43 2236 807 Fax: +43 2236 73148 E-mail: publications@iiasa.ac.at

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Sustainable development – ten arguments against a biologistic 'slow-down' philosophy of social and economic development

Gerhard K. Heilig

IIASA, Laxenburg, Austria

Key words: sustainable development, 'back-to-nature' ideology, social evolution, conflict, social theory

SUMMARY

This paper is a provocative collection of arguments that came to the author's mind when reading through some of the literature on sustainable development. Similar to rather general sociological theories, these sustainability concepts – which are rooted in biological observations and theories of the non-human biosphere – describe elements of a universal development philosophy. But they fail to take into account some of the most basic characteristics of how *human* societies and economics function and develop. For instance, they largely ignore the role of conflict, the fundamental diversity of interests and lifestyles, power imbalance in and between human societies and the specific dynamics of pioneer development. Most importantly, they define life-support systems almost exclusively in bio-geophysical terms – ignoring the fact that human development primarily depends on the accumulated scientific and technological knowledge and on the cultural heritage of institutions and arrangements which represent successful solutions of social, economic and political problems.

INTRODUCTION

The word 'sustainability' is commonly used in two ways: (a) as a technical term for analyzing certain characteristics of specific biological systems, such as coral reefs or wetlands (Munasinghe and Shearer, 1995); and (b) as a programmatic statement for a diffuse philosophy of development. This second context of the sustainability debate is far more prominent; numerous conferences, commissions and workshops organized by UN agencies, NGOs and scholarly organizations have dealt with or even promoted this idea of sustainability in development.

This paper will deal only with the second context. It will argue that the phrase 'sustainable development' has largely remained a catchword of political debates at international conferences. Its definition is extremely vague, if not ambiguous, despite numerous publications and commissions which have tried to clarify it. The concept still lacks generally accepted empirical indicators and is loaded with hidden value assumptions. Usually, there is no clear temporal, geographical and sectoral reference, and questions of scale dependence are mostly ignored. In addition, the

Correspondence: G.K. Heilig, International Institute for Applied Systems Analysis (IIASA) Schlossplatz 1, A-2361 Laxenburg, Austria. e-mail: heilig@iiasa.ac.at

concept of sustainable development is often used to promote anti-western political propaganda or a 'back-to-nature' ideology. The concept is rooted in biological observations and theories of species interaction and non-human ecosystem change. But it ignores or misinterprets some of the most fundamental characteristics of social, political and economic systems, such as the gross diversity of interests, the function of conflict as a major force of socio-economic development, and the power differences between various actors. These shortcomings will be highlighted in ten arguments. However, some introductory remarks are required.

First, I will not burden the reader by reviewing the various published definitions of sustainable development. A most extensive collection of 33 different definitions (including well known definitions by Lester Brown, Robert Repetto, Robert Allen, Peter Bartelmus and William C. Clark) can be found in the Appendix 1 to Pezzey (1992). To my knowledge, however, there is no definition of sustainability available today that would meet all (or even a few) of the requirements discussed in this paper. Many international activities for studying and promoting sustainability have not even attempted to define their subject matter. For instance, in its *Work Program on Indicators for Sustainable Development* the United Nations Division for Sustainable Development has not included a single line of text that would specify what they consider 'sustainable' (United Nations, 1995).

Second, I want to emphasize that the following discussion does not question the necessity to protect our natural environment. It does not argue against reasonable measures to preserve species diversity or reduce greenhouse gas emission. The paper does not dispute the advantages of preserving natural land. And it does not raise doubts whether it makes sense to explore global climate change – there is, in fact, evidence suggesting human influence on the global climate (Kerr, 1996; Jacoby *et al.*, 1996). All this is not the subject of the following paper. This paper will, however, criticize the attempt to apply ecological and biological concepts to social, economic and political change and to legitimise drastic measures of 'social engineering' with bio-geophysical research results. The paper will argue that the idea of sustainable development is highly inappropriate to understand the structure and dynamics of human systems. Serious geo-biophysical research should be careful not to become identified with the nebulous 'social' and 'economic' development theories of those who want to promote sustainable development at all costs, even if it means stopping modern industrial civilization. Moreover, serious global research should separate itself from environmental extremists who use the sustainability concept to promote their radical political agenda, such as that exemplified in the following statement: 'I think if we don't overthrow capitalism, we don't have a chance of saving the world ecologically. I think it is possible to have an ecologically sound society under socialism. I don't think it's possible under capitalism' (Graber, 1989).

ARGUMENT 1: WHAT IS SUSTAINABLE FOR THE *PRESENT* GENERATION IS NOT NECESSARILY SUSTAINABLE FOR FUTURE GENERATIONS, AND *VICE VERSA*

So far not much thought has been given to the problem of time horizons in the debate on sustainability. For instance, are we talking about the life span of a few human generations, the survival of the human species or the time scale of the global biosphere?

For many generations, people in Europe and North America were not only able to sustain but even to improve their living conditions. Usually they are wealthier than their great-grandparents, they are better educated and enjoy a much longer, healthier life (life expectancy has almost doubled since pre-industrial times). Their environment is less polluted in many respects. While people in the early Industrial Age suffered from incredible air pollution, toxic waste disposal (such as lead) and poor sanitation, the current generation mostly has safe drinking water, proper sanitation and waste collection, clear skies, and (sometimes) even clean rivers and lakes for swimming. In Germany's industrial heartland, the 'Ruhrgebiet', smoke and dust from coal mines and steel production darkened the sky less than 50 years ago; massive emission of heavy metals and sulfur polluted the environment. Today, the very same area advertises its blue skies and green re-cultivated landscapes as a tourist attraction.

Despite the amazing success of modern industrial societies dire predictions are produced by those who believe in sustainable development. They predict that we will leave our children a global environment which is in a much worse condition than the one we inherited: with deforested landscapes, polluted rivers and oceans, exhausted soils, a CO_2 overloaded and overheated atmosphere, exploited resources and a decimated number of species. But do we really exploit our children and grandchildren? I am afraid this is less certain than sustainability promoters would have us believe.

Let us for the moment assume that the doomsday scenarios were all true (which I doubt). Would that be a reason for despair? I do not think so, because we would leave the next generation not just a partially polluted and destroyed physical environment, but also an unprecedented array of new technologies, powerful economic arrangements and institutions, and impressive scientific methods for analyses, observation and planning. They would have much more powerful tools to deal with environmental damage than our generation had when we began to clean up the heavy pollution from early industrialization.

Economists have calculated inter-generation flows of wealth and demographers have dealt with the generation contract of pension systems, but not much is known about the inter-generation aspects of technological and economic change. Sketchy evidence suggests that pioneer generations have often done the dirty work of first-stage economic development (including a crude and dirty industrialization) – while it was the privilege of later generations to emphasize environmental concerns. For the post-war generation in Europe, smoking chimneys were a sign of economic recovery – only the generation of their children disliked this first source of their wealth. Chinese government officials, supported by many Chinese scientists, have argued that (economic) development is a multi-stage process in which an inherently 'unsustainable' phase of crude industrialization is necessary to kick-start a subsequent period of more sustainable economic and social development.

Entrepreneurs know that you have to invest for future returns. So it might be smart to 'borrow' some resources and some animal and plant species from future generations, because with this investment the present generation might be able to reach a stage of development from where these future generations can proceed on an environmentally more benign path. In other words, it could be a terrible mistake to slow down industrial, scientific and economic development today in countries such as China for fear of unsustainable growth. Would it not be better if China had started its industrialization and modernization of economy 45 years ago when the population was less than half the size of today? Today, Africa has 630 million inhabitants. In 2050, it is projected to have more than three times as many people (2 billion) who will demand their share of wealth and economic growth. The slow-down ideology of sustainability advocates is in effect a measure to postpone responsibility. If the present generation will not develop Africa and parts of Asia (for fear of ecological damage), future generations will have a much tougher job with much greater risks for the global environment. Inter-generation changes in wealth, resource availability, biological diversity and human capacity are far more complex than the simplistic notion of 'sustainable development' suggests.

The temporal dynamic of economic and technological change is not a 'zero-sum game', where nature always must lose what the human civilization wins. There are stages of development where both can win – the natural environment and the human economy and society. The *village* civilization, frequently endorsed by the 'sustainability' advocates, was not such a stage. It might have been nice for the non-human environment, but it did cost a high price in the quality of human life. It was the western high-tech agriculture and industrial production which – for the first time in history – gave billions of people the freedom from famine, plague and poverty. And – despite our supposedly terribly damaged environment – this modern industrialized civilization has achieved the lowest infant and maternal mortality and – by far – highest healthy life expectancy ever. More people can enjoy a wealthier and healthier life than in any previous generation.

Inter-generation development dynamics are affected not just by the biogeophysical starting conditions of each generation. They are also shaped by the social and cultural 'heritage', by

the amount of scientific knowledge, technological expertise, and socio-economic problem solutions accumulated by previous generations. Modern civilization is not the ultimate harm to the environment; it is just a phase in human evolution with great potentials – both for destruction (of nature), but also for problem solving. There is no reason for unbounded faith in the future – but the excess of timidity built into the sustainability concept is equally unjustified.

ARGUMENT 2: THE CONCEPT OF 'SUSTAINABILITY' IGNORES THE FUNDAMENTAL DIVERSITY OF INTERESTS

A very powerful metaphor has influenced the discussion on global (environmental) change, including the idea of sustainable development: the **'lifeboat'** paradigm, which states that we are all in the same boat to fight for the survival of mankind. Of course, this is nonsense. We are not all in the same boat. Some of us have private yachts with radar navigation while others cling to a piece of wood in a menacing sea, hardly able to see beyond the next wave – metaphorically speaking.

There is *fundamental* discrepancy of interests in our world. The desire for fresh air and green forests among European intellectuals is not shared by impoverished campessinos who fight for survival on a day-to-day basis in the squatter settlements of Mexico City or Rio de Janeiro. Their immediate concern is to find paid work and food, even if it means labouring in the dust and smog of old-fashioned industries or cutting down rain forest for cultivation. Not only the poor of the Third World often disagree with what 'western' academics and politicians consider to be in their best interest. Governments of developing and (post-) industrialized countries also have divergent priorities: While the reduction of (unnecessary) crop areas and their transformation into 'natural (forest-) land' is a major objective of Germany's agricultural policy – both in terms of economic efficiency and environmental protection – it would be an absurd goal in Nigeria or China.

We all want a better life for ourselves and our children and most of us even share some interest in the survival of mankind – albeit some environmental extremists have argued that it would be better for the planet's ecosystem to get rid of *Homo sapiens*[1]. But this is where the shared interest ends. There are people who feel absolutely happy in the urban jungle of Manhattan Island in New York City, while others think it is almost hell on earth with unbearable sound pollution, traffic jams, high crime rates and the complete lack of a natural landscape and ecosystem. Those who spend most of their time in the rather artificial environment of a stock exchange, live in a 50th floor penthouse and relax with roaring sound in a smoke-filled discotheque will hardly understand why they should spend money and effort to protect some swampy mosquito-infested area which is considered essential by some biologists and green activists.

People who have lived all their life in close contact with a natural environment can better appreciate the concept of 'sustainability' – right? What about the fishermen of Norway and Iceland who cannot understand why they should stop slaughtering seals. What about the slash-and-burn farmers of Africa and Latin America – are they just ignorant of their unsustainable activities? The whole world – it seems – is outraged by the killing of whales – except most people in Japan (notably the Japanese fishermen) who think that the consumption of whale meat is absolutely essential for the Japanese way of life (and their personal economic survival).

A gross diversity of interests not only exists between different cultures and between people of affluent (post-) industrial societies and the millions of poor in the developing world. There is also a conflict of interest within these countries. For generations a few dozen rich families of Latin America have exploited the subcontinent – often

[1]One such environmental extremist is David M. Graber, a research biologist with the US National Park Service. Spitting with rage he wrote in a *Los Angeles Times* Book Review: 'Human happiness and certainly human fecundity are not as important as a wild and healthy planet. I know social scientists who remind me that people are part of nature, but it isn't true. Somewhere along the line – at about a billion years ago and maybe half that – we quit the contract and became a cancer. We have become a plague upon ourselves and upon the Earth. ... Until such time as *Homo sapiens* should decide to rejoin nature, some of us can only hope for the right virus to come along'. Cited from: Ray, D.L. and Guzzo, L., 1993, 204

in rather unsustainable ways for the rest of the population. But their own way of life proved to be rather sustainable.

But is it not some kind of ultimate goal for everyone to live longer and be educated? I am afraid – it is not. Unfortunately, in our world people often live under conditions which are so horrible and depressing that they have given up all hope. Hundreds of thousands of street children in Asia and Latin America are harming their health in prostitution, drug consumption and dangerous activities. They cannot even waste their energy for something so useful as reading and writing –why should they care for the environment? They need to be street-smart to survive the urban jungle the next day. And there are those 10 million people in Africa (and a projected 40 million worldwide) who are (or will be) HIV infected or are already suffering from AIDS. They often live in absolute poverty and they know they will die soon, because even if there will be a cure for AIDS it will be most likely too expensive for them. There are also people in highly developed societies who are living a fast and risky life, which revolves around drugs, promiscuous sex and all kinds of self-destructive activities. Why should they care for the survival of some rare species?

The lifeboat paradigm suggests a harmony of interests and lifestyles which is a dangerous fiction of egalitarian prophets. It is one of the major characteristics of our world that people fundamentally disagree about objectives, values and lifestyles.

ARGUMENT 3: WHAT IS SUSTAINABLE FOR *SMALL* GROUPS (SOCIETIES, ECONOMIES) CAN BE RATHER UNSUSTAINABLE FOR LARGER ENTITIES

Let us assume, for the sake of this argument, that all people of the world were enthusiastic followers of the concept of sustainability (whatever it means). We further assume that they all would agree on what to do to reach this goal. Would this global harmony of interests and strategies bring us sustainable development?

Of course not. It cannot work, because there is a problem, which is well known to economists and organizational sociologists: the incompatibility of similar actions on different (economic or social) levels and scales. For instance: a small village society in a rain forest area can achieve perfect sustainability with an integrated economy based on hunting, fruit collection and small-scale slash-and-burn farming. But this way of life would be highly unsustainable for Brazil's total population. And, of course, there is no way that China's 1.2 billion population could survive as hunters, fruit collectors and slash-and-burn farmers – almost 10 000 years ago they had to switch to an agricultural economy and convert large segments of natural into cultivated land.

Increasing population (density) is probably the most well-known factor which can transform ecologically-adapted into disastrous behaviour. For centuries East African nomads used to live as pastoralists in (more or less) perfect harmony with their savanna environment. But then this population doubled and tripled within a few decades due to a rapid decline in infant mortality. Economic conditions initially also improved, so that they could increase the number of cattle substantially (well beyond the growth rate of the human population). This increase in people and animals lifted the East African nomad society above the carrying capacity of their land – given their level of technology. A previously well adapted pastoral economy became a threat to the environment. Overgrazing, destruction of the grass cover due to trampling of cattle, exploitation of the scarce water resources became major problems.

ARGUMENT 4: WHAT IS *ENVIRONMENTALLY* SOUND MAY NOT BE ACCEPTABLE FOR OUR SOCIAL STRUCTURE, OUR ECONOMY OR OUR CULTURE

We have already mentioned the diversity of interests, the question of time horizons and the scale-dependence which make it impossible to define sustainability as a universal concept. But the most serious obstacle to a universal concept of sustainability is the fact that human life has to deal with more than one dimension. Stability of our ecosystem is only one of many concerns. The fear of global catastrophe in natural life-support

systems, which borders on hysteria among some radical environmentalists, is shared by only a small group of scientists and intellectuals. Most people have other problems.

In a global perspective, hundreds of millions have to deal with the stability and efficiency of their social and political systems. Large sections of the African population are struggling to survive civil wars, rapidly spreading epidemics of lethal diseases, and extreme poverty, as well as social and cultural disruption. Corrupt dictators and military regimes terrorize and exploit the population. Millions suffer from malnutrition and complete lack of education. Under these conditions, few people can afford to think about the sustainability of their agriculture or industry.

Many measures to minimize environmental degradation (which probably could be seen as a first step towards sustainability) require a stable and efficient political and economic system. They need educated and healthy people as well as functioning social structures for their implementation. But these do not exist in large parts of the world. Therefore, it is necessary to improve the social, economic and political situation, before one can even think about sustainability.

It might be necessary to introduce rather unsustainable methods in one sector of society to make other sectors more sustainable. For instance, should we not support a rapid modernization of agriculture everywhere in Africa, Latin America and Asia, including the development and use of biotechnology even if these seem to be rather unsustainable practices. It might be the only way to feed the projected 10 billion world population. (I hope everyone agrees that sufficient nutrition for everyone is a basic condition for sustainable development.) Some people might argue that it would be sustainable not to have a 10 billion world population; but, as every demographer knows, this is a non-option, because the demographic momentum – no matter what –will (at least) add another 3 or 4 billion to the present world population (Lutz, 1994). Most demographers believe that a doubling of the world population by the middle of the next century is quite likely. The immediate problem is to obtain food, housing, education for these additional billions of people.

The hard decision might be that we either use high-tech agriculture, including deforestation and some local environmental degradation due to over-use of fertilisers and pesticides and double or triple food production in Africa and Asia, or just sit there and watch hunger camps on our TV monitor. We have a taste of what might happen if we follow the sustainable advocates in agricultural development: most countries in Africa south of the Sahara (with the exception of South Africa) have failed to modernize their agriculture during the last three decades – fertiliser and pesticide use is a small fraction of what is typical in Europe or Asia (or simply non-existent) and there is almost no mechanization. This stagnation might have been more sustainable for the environment than Asia's rapid agricultural modernization, but it was also a demographic, social, economic and public health disaster. Millions of Africans were harmed by long periods of undernutrition and famine. The rural social structure eroded in many regions, because a large section of the rapidly growing population could not live from the land (given the low level of agricultural productivity) and had to migrate to the cities.

China, on the other hand, radically modernized its agriculture and converted natural ecosystems to cultivated land. The consumption of nitrogen fertilisers has increased 10 to 12 fold since the early 1960s and has now reached a level that is higher than in some European countries. China's farmers use high yield varieties of crops and modern methods of livestock production – and probably did many things that are not very sustainable. But they also tripled grain production and saved China from large-scale famines which were typical in much of the country's previous history. Today, infant mortality is down and life expectancy is up to almost western levels (partly due to better nutrition). China's present economic boom, which is mostly driven by its rapidly modernizing industrial sector, would not have been possible without the stable basis of a modernized agriculture.

ARGUMENT 5: THERE ARE BIG DIFFERENCES IN RESILIENCE OF NATURAL ECOSYSTEMS AGAINST HUMAN INTERVENTION

The discussion on sustainability has rarely taken into consideration the fact that some

environments are far more fragile than others. Behaviour and modes of production that are acceptable in one environment might be disastrous in another. For instance, it is well known that many tropical rain forests have a very thin layer of soil which – in addition – can have serious constraints and deficiencies (such as low cation exchange capacity). Clearing these forests for cultivation will usually cause much more harm than cutting down the same size of plot in a boreal forest. Other examples of fragile environments are savannas, perma-frost zones, coral reefs and high altitude plateaus and steep mountain slopes.

Some agro-climatic zones are more robust than others because they obviously have a high capacity for regeneration. There might be a huge layer of loess (such as in the East China loess plateau) or a river which brings water and fertile mud (as in Egypt). In other places, the climate conditions might be very favourable for forests and agriculture. There are regions and ecosystems which have such a high resilience that they could remain stable for tens of thousands of years despite intense human intervention. This is why people have managed to survive since ancient times in places like the Nile Delta or the East of China.

Behaviour and modes of production that are acceptable in robust (environmental) systems, might be highly destructive in others. In other words: there can be no universal indicator for unsustainability. It can be only defined in relation to a specific bio-geophysical system.

ARGUMENT 6: NOT *ALL* SPECIES OR ECOSYSTEMS ARE EQUALLY ESSENTIAL FOR SUSTAINING *HUMAN* DEVELOPMENT

Proponents of sustainable development (especially those with a strong biological perspective) have difficulties to understand why not everyone can appreciate the intrinsic value of each species. These scientists are so fascinated by the complexity of ecosystems and species interactions that they consider the whole biosphere – and not just certain basic life-support mechanisms – essential for our survival. But do we really need each and every microbe or fungus? Do we even need each and every higher animal? Does evolution need all these species? The human species survived for millions of years without dinosaurs and without a large number of other species that died out long ago *without* human intervention (Knoll *et al.*, 1996).

The error of radical biologists is to focus on the survival of individual species, instead of functional groupings. Natural evolution was less restrictive. It created and often eliminated numerous species; but many of these were just functionally equivalent variants within certain ecosystems. Simon Levin, for instance, has argued that microbial decomposition (which is essential for many life processes) can be performed even if the species composition of the microbial community is significantly altered (Levin, 1995). Simply put: there are – at least in certain biological systems – multiple solutions for sustaining vital life processes. If there are multiple solutions for certain functions in the non-human biosphere, it is quite possible, if not likely, that there are multiple solutions for maintaining human life-support systems. For instance, we absolutely need oxygen in our atmosphere and biomass is essential for its production. But the species composition in the biomass is irrelevant for this specific function, as long as its oxygen productivity is the same. Managed recreational forests might be as good in producing oxygen as undisturbed forest ecosystems.

From an anthropocentric point of view, sustainable development would aim to find out, which ecosystem functions and species are really essential for human survival. For instance, do we really need the smallpox or the HIV virus on our planet? Do we need each and every butterfly or bug? These, by the way, are not rhetorical questions. Only recently, laboratories in the USA and Russia had to decide whether they should destroy the last samples of smallpox viruses, and most likely eliminate this species from earth. Radical biologists have complained that we would lose valuable genetic material by eliminating these viruses.

But is every loss of genetic material, as such, a bad thing? Why would evolution have eradicated numerous species (before the existence of human beings) if it would have been better to preserve it? From cognitive science, we know that being able to forget things is absolutely essential for learning. Only when we can forget irrelevant information

are we able to process and develop new data – otherwise we would be mentally paralyzed by information overload. If natural evolution is a process of phylogenetic learning, then species extinction could be seen as a method of getting rid of redundant or deficient genetic material.

With a world population of 5.5 billion we cannot prevent human development from eradicating species and natural ecosystems – but we should be careful not to eradicate those species and ecosystems that are unique and essential for life support. Setting priorities for preservation might be a better strategy than dreaming of universal preservation of the non-human biosphere.

ARGUMENT 7: THE CONCEPT OF SUSTAINABILITY IS BASED (WITHOUT SAYING SO) ON A SOCIAL CONCEPT OF *HARMONY* AND *ALTRUISM*; THIS IGNORES THE FACT THAT HUMAN DEVELOPMENT IS OFTEN DRIVEN BY *CONFLICT* AND FIERCE *COMPETITION*

For years, biologists have studied systems of animal and plant species which show a striking compatibility of their components: individual species of these systems obviously provide some kind of 'assistance' or 'service' to others, thus creating a complicated network of dependence. One species, for instance, would produce products which are necessary for other species to survive in the same environment. A well-known example is the 'service' of insects for the fertilization of plants which, in turn, provide food to the insects. There are, of course, much more complicated chains of 'services' between species – often extending over many different levels from higher animals down to primitive bacteria and fungi (Schoener, 1989). Research on food webs has uncovered thousands of these interdependencies in natural ecosystems (Elton, 1958; Levin *et al.*, 1977; Levin, 1989; Odum, 1983; Paine, 1980). Sometimes, it seems that the species can even 'learn' behaviour which is of mutual benefit to them all. There has also been much research on the topological structure of those food webs (Cohen, 1977; Cohen, 1989; Pimm, 1982; Sugihara, 1982; Yodzis, 1989).

Based on this research, some scientists have drawn the conclusion that the whole world, including the human species, is a network of dependencies in which mutual benefits stabilise the system. This is the idea that humans are not only part of a global ecosystem but totally depend on these linkages for their own survival. Therefore, we not only have a moral obligation for the well-being of all other species, but a vital interest. A radical version of this idea assumes that there is (or should be) some kind of harmonious co-evolution between the human and non-human biosphere in which all life-forms have essentially the same value and right to survive (Norgaard, 1984). Therefore, we should not have the arrogance of putting human well-being first (Elliott, 1996; Ehrenfeld, 1978). The 27 principles of the Rio declaration on sustainable development follow this spirit of altruism and human interconnection with 'mother nature' (Strong, 1991).

While this is certainly a popular and noble doctrine, it does not explain many features of human behaviour which evolved as a product of fierce competition with other species (and with fellow humans). Many great achievements of mankind were based on the destruction of previously existing natural (eco-)systems. Without the invention of agriculture and animal breeding – which destroyed many wetlands and forests as well as numerous animal species – the human race would not have been able to increase its number above a few hundred million individuals. The human species *never* lived in total harmony with nature or itself – otherwise it would not have been necessary to develop a voluminous neocortex, tools, weapons, language, social organization, division of labour and many other things which are unique to humans.

Human action in history was often targeted to achieve a comparative advantage over other species and the forces of nature to make us independent of specific conditions in our environment. We learned to make fire, so that we could live in dark caves and colder climates. This also gave us a comparative advantage against coliform bacteria, mosquitoes and wild animals – thus saving many human lives (cooking food kills dangerous bacteria and parasites in raw meat; smoke drives mosquitoes away; wild animals shy away from fire). Whenever archaeologists dig out a resting place of stone-age people they find two things: charcoal from fires and tools to kill animals

(and probably other humans). Whoever has doubts about the competitive nature of the human species should visit the collections of anthropological museums: usually, there are endless displays of spearheads and arrowheads and hand-axes. It is hard to believe that our ancestors used these weapons just to perform folk dances – they used them to expand their food chain to anything they could hunt and to fight for dominance of (and in) their own tribe. Krech has reported archeological evidence that warfare and genocide were quite frequent in North American tribal societies even before Columbus' arrival (Krech, 1994).

Using tools and strategies to improve one's food supply and reproductive advantage at the cost of other species (and human neighbours) has been a dominant trend in human evolution. We have already mentioned the invention of agriculture and animal breeding which transformed huge natural ecosystems into cultivated land. But the human race invented many other 'tricks' for gaining comparative advantages, such as pesticides, fungicides, nitrogen fertilisers, food preservatives, fences, rifles. For centuries, we have been changing the genetic structure of crops and domestic animals through breeding. In the future, we will most likely directly modify the genetic structure of crops, vegetables and domestic animals in order to feed an almost 10 billion world population projected within the next 55 years. The whole evolution of the human species indicates that we are not happy just being part of a sustainable ecosystem. We want to dominate and grow. Through all kinds of inventions, we try to shape our environment for our benefit – even if it is at the cost of other species and our human neighbour. We are a 'competitive animal'. The concept of sustainability implies that our actions should not unbalance the ecosystem of which we are a part, but this is precisely what the human species has always been doing.

For instance, without routinely killing rats, mice, rabbits and other animals, and fighting crop diseases, a 5.5 billion world population simply could not survive. Mass extinction of mosquitoes, lice and rats greatly improved human health. Fighting rats and other 'hygiene' measures helped to stop the horrific bubonic plague, the 'black death', which killed some 25 *million* people between AD 1348 and AD 1666 – one third of Europe's population (Davis, 1992; Walter and Schofield, 1989). With the exception of the recent 'Great Famine' in China (which had famine casualties of at least 23 million people during the 'Great Leap Forward'), this was probably the most deadly natural catastrophe for the human race in recorded time (Ashton *et al.*, 1984).

But are there not people living in relative harmony with their natural environment, happy with their way of life? What about those small groups surviving peacefully in the remote forests of Papua New Guinea, Kalimantan, Sulawesi or the Amazon? They may be nice to the natural environment, but the rest of the community is usually not very nice to them. Most likely they will lose (as so many before) the competitive race between human civilizations long before the advanced industrial societies were 'punished' by the environment for their supposedly unsustainable development.

Natural evolution was not this kind of harmonious co-evolution of each and every species – linked together by co-operation in networks of mutual benefit – that sustainability advocates seem to imagine. There were winners and losers among plants and animals. And, when it comes to human civilizations, it is outright absurd to ignore conflict, war, defection, or economic competition as fundamental driving forces of development. Most of our recorded history is filled with these events. In fact, one can demonstrate that a strategy of 'simple-minded co-operation' will always lose in an environment where the other 'players' can get a slight advantage by not co-operating (Nowak *et al.*, 1995). This, for instance, happens when a company can make a nice profit by cheating environmental legislation.

Research on strategic games (such as the multi-instance 'prisoner dilemma') has shown that, in human societies, co-operation and conflict must be balanced in a sophisticated way by anticipating the possible reaction of others in order to win. It is therefore naive to believe that people (or industries or nations) could be convinced to co-operate for sustainable development just for the sake of harmony with nature. Human interaction is often based on bargaining, open threats, economic pressure, blunt coercion or a strategy of limited retaliation against non-co-operation. In other words: intentional conflict of various

degrees is routinely used in human environments. This 'diplomacy of violence' (Schelling, 1966) is one of the fundamental principles of all social, economic and political development. The spirit of mutual altruism – co-operation, fairness and equality – which underlays the Rio Declaration on sustainable development – emphasizes the idea of an 'integral and interdependent nature of the Earth, our home'. But it ignores the function of conflict in the human sphere, which is also a most fundamental mechanism by which human societies develop and decline.

ARGUMENT 8: *MORALIZING* WILL NOT HELP TO MAKE HUMAN ACTIVITIES MORE SUSTAINABLE

Nature lovers often argue that unsustainable development is a result of economic, social and political perversity and degeneration. If only those human frailties and ills could be cured, the world would be a place of harmony between nature and the human species. John Holdren, Gretchen Daily and Paul Ehrlich are the most prominent advocates of this idea. In a recent paper (which has a completely misleading title suggesting it would deal with biogeophysical aspects of sustainability) they develop a socio-political utopia (Holdren *et al.*, 1995). They say: *'We think development ought to be understood to mean progress toward alleviating the main ills that undermine human well-being. These ills are outlined . . . in terms of perverse conditions, driving forces, and underlying human frailties'*. With almost endearing naivety they demand the elimination of those human deficiencies that cause unsustainable development – which they identify as *'greed, selfishness, intolerance, shortsightedness, ignorance, stupidity, apathy, denial, corruption, misuse of technology, and mismanagement'*. They only forgot to tell us *how* this brave new world of good people living in harmony with nature could be brought about. It obviously requires a little more than just moralizing about social evils.

One might sympathise with a moral view of human development, but a scientific approach has to take into account that human evolution and development – unfortunately – at times proceeds despite widespread greed, selfishness, criminal activities, intolerance, shortsightedness, corruption, misuse of technology or unscrupulous exploitation of nature. And there are even cases where human development is promoted by these evils. 'Greed' (in the form of 'profit orientation') is a powerful driving force to improve economic efficiency. And occasional 'misuse of technology' (in the form of artillery or laser bombs) – unfortunately – has a long tradition in the establishment of relatively stable political empires.

The social, economic and political world is not similar to a system of species interactions and life-support functions (as biologists tend to believe); it is something completely different. The human world, for instance, includes *intentional* use (and misuse) of economic power and physical force to dominate and exploit other human and non-human populations. It includes ideologies, fanaticism, violence. In the real human world, one can find leaders, who put fire on oil wells to cause an environmental disaster. Societies are *not* organisms, where the parts are well integrated to function as a system; societies often fall apart – fragmented by violent social, political and economic conflict (as in Rwanda and Burundi).

It is true that human societies have also developed institutions and strategies to moderate conflicts (over resources), punish (environmental) crime, or convince people to modify their ('unsustainable') behaviour. Moralizing, however, was usually found quite useless for achieving these goals. It only helped to 'pull the troops' together and lift the morale of those nature lovers who already shared the perspective. To convince people about sustainable development, whose interests sharply contradict the suggested measures, one needs a much deeper understanding of social, economic and political processes in human societies than a simple scale of virtues, as in a moralizing approach. This brings us to our next argument.

ARGUMENT 9: THE CONCEPT OF SUSTAINABLE DEVELOPMENT REDUCES THE ANALYSIS OF SOCIAL, ECONOMIC, CULTURAL AND POLITICAL PROCESSES TO A SIMPLISTIC *BIO-PHYSICAL* FRAMEWORK

The concept of sustainable development tries to understand technological, economic, political,

social and cultural development in human populations in a conceptual framework which was derived from studying biological and physical systems. What is wrong with this rather simple method of using analogies has been demonstrated extensively in the sociological, economical and political science literature of the past 200 years[2]. Unfortunately, most advocates of the sustainability concept seem to be unaware of this literature. They also seem to be ignorant of the fact that much in today's sustainability discussion is just another of the numerous historical variants of biological reductionism that have been proven to be inappropriate as a scientific method to explain development in socio-economic and cultural systems.

To a large extent the sustainability discussion is a fall-back into a pre-scientific approach of understanding how societies, economies and cultural systems operate and change. The debate was initiated by politicians who basically wanted to promote their political ideas and ideologies. They were assisted by natural scientists (primarily with biological backgrounds), who thought that they would better understand the dazzling complexity of human societies and economies rather than the sociologists, demographers and economists who have studied them previously. There is nothing wrong with cross-disciplinary (scientific) competition, but the newly introduced concepts should have a higher explanatory value than the old theories. So far, I cannot see how the concept of sustainable development would be superior in explaining, predicting or modifying the complicated, ever changing social and economic structures, objectives and procedures in our societies:

- The concept, does *not* deal with the fundamental social problem of **power imbalance** between societies and social groups (a major obstacle in environmental negotiations).
- It does *not* identify the **social, economic and political structures and processes** a society could use to promote sustainable development. Obviously, one needs a little more than the media hype of environment conferences and moralizing essays when it comes to negotiating the hard facts (and dollars) of environmental policy and legislation on a background of sharply divergent interests.
- And the concept of sustainable development does not explain how **development objectives** are generated and modified in social processes involving politicians, mass media, scientists and ordinary people. All it does is to postulate objectives and demand activities – as if they would follow automatically from the bio-geophysical diagnosis of our environment.

ARGUMENT 10: CURRENTLY, THERE IS NO METHODOLOGY AVAILABLE TO *MEASURE* AND *RANK* 'SUSTAINABILITY'

Finally, using just words to describe conditions which we consider more or less sustainable is inadequate for a scientific approach. We need quantitative measures to identify sustainability. These are not in sight. So far, the most ambitious effort to develop 'Indicators of Sustainable Development' was launched by the United Nations Division for Sustainable Development in collaboration with The World Bank, The World Resources Institute and many Global Change research centres. Unfortunately, this UN initiative completely ignored the scientific discussion on the issue of sustainability and focused on the compilation of a 'shopping list' of existing statistical indicators (which all of a sudden became indicators of sustainable development).

Some indicators in early versions of this list were just absurd, such as: 'Total Population'. Is a large population good for sustainability, or a small population? Which population is more sustainable: the 1.2 billion Chinese or the few

[2]It would require a separate paper to spell out all the evidence which has been accumulated in order to prove that social, economic, political and cultural systems do *not* function like complex biological systems. Of course, it is possible to analyze and model certain characteristics or dimensions of socio-cultural systems with the help of biological analogies. While these might explain some specific aspects, there can be no doubt that some of the most important structures and processes are *not at all* similar to those in animals or ecosystems. See for instance: Etzioni, A. (1968).

million Massai of East Africa? It is obvious that these questions cannot be answered, because the size of a population does not correlate to anything that could be defined as sustainability (by the way, the new indicator: 'Population Density' is not much better). It is not acceptable that compilations of conventional statistical indicators are just re-defined as indicators of sustainable development. This label switching does not solve any of the above-mentioned problems.

I believe that the concept of sustainable development is often just used as a nebulous development ideology. But let us assume it could be developed into a scientific concept, then it would be necessary to use empirical indicators that are compatible with the following methodological requirements:

- Before we begin to measure sustainability we have to say what we intend to measure; that is, we have to define the concept.
- Any indicator for sustainable development has to specify the context, time-frame, scale, and domain, because it can make a big difference if something is sustainable for the (current) environment, a specific economy, a political system, a certain ethnic group, the human species or the world's biosphere in the 21st century.
- Every measure of sustainability must explain whether a high value in that indicator means low or high sustainability. (It is almost comical that 'population size' was suggested as an indicator, without the slightest intent to explain whether a large population is good or bad for sustainability.)
- Any indicator of sustainability must be based on valid, reproducible empirical data.

CONCLUSION – PREPARING THE GROUND

Should we then conclude that sustainable development is just a naive socio-economic fiction of natural scientists or the ideology of 'green' activists? Certainly not! There is, of course, the danger that various technological, demographic, economic, social or political developments might destroy essential life-support systems of our planet and thus undermine the biophysical basis of our existence. But – contrary to widespread propaganda – it is not clear which trends will be more or less harmful to the natural environment in the long run. Most important, however, we have not even begun to understand, how various measures intended to promote environmentally sustainable development will affect the demographic, economic, social and political sustainability of the human species. It is, for instance, not at all clear which environmental changes will affect which section of the global population to which degree and in which period of time.

The decisions we have to make are not simply between good or bad, sustainable or unsustainable. They are in all shades of grey. We often face painful trade-offs between short-term damage and long-term development towards a more sustainable economy (Becker, 1982; Coase, 1960). China's exploding CO_2 emissions from industrialization are certainly a reason for concern, but should China wait another 60 years with its development and remain an agricultural society? Is that possible? Can the Chinese agriculture be modernized to feed another 300 million people *without* industrialization (such as building up a chemical industry for fertiliser production)?

There is a tremendous uncertainty, not only in our understanding of the biophysical mechanisms in global life-support systems, but more important, in our anticipation of possible consequences and side effects of different development paths (Arking, 1996). What can we do in this situation of uncertainty and divergence of interests? Preparing the ground for a development that has greater awareness of (global) environmental problems is all we can do. From a social scientist point of view there are seven clear lessons for us to learn:

(1) It is important to **establish structures, institutions** and **mechanisms** to **handle conflicts of interest and judgment** concerning social and economic development. Since we cannot – and should not hope to – eliminate divergent interest and judgments we must feed them into a process of global – but also regional and local – discussion and negotiation.

Organizing mammoth Environmental Conferences, where thousands of sustainability advocates are flying to exotic conference centres – burning valuable fossil fuel – is not the right way. Some promoters of sustainable development believe a sustainable future could be achieved through a combination of scientific research and 're-education'. They think that we only have to generate 'objective' scientific evidence (on global warming, ecosystem destruction or on species reduction) and educate people and governments about the disastrous consequences of their activities. Enlightened people would then live sustainably. This naive naturalistic approach is an attitude of the 17th and 18th century. It ignores the fact that our future as a species is open and a product of competing development strategies. Multiple paths of development are possible and only 'ex post' will we know if one was sustainable in the long run. Even if our scientific knowledge about life-support systems was complete and undisputed, people would not automatically agree what to do. Development is a matter of priorities, values, styles – and therefore, inevitably, a matter of conflict and competition.

(2) Science will quickly lose its credibility if it does not speak out against those phony prophets who constantly raise false alarms by blaring out a litany of global catastrophes. Too often in recent decades was the public mislead to believe that global disaster was just around the corner – when in fact scientific evidence for that was sketchy, inconclusive or wide open to interpretation. If global change research would be seen as a pursuit to serve the political agenda of environmental extremists, its reputation would soon be ruined. Calm reason and the search for empirical evidence is the trademark of good science – not alarmist speculation based on quickly assembled models. In a world where esoteric nonsense and pseudoscientific hoax is flourishing it is essential to maintain public confidence in the scientific enterprise (Chandrasekhar, 1990).

(3) Scientists should also have the courage to **denounce false prophets who trade in 'easy solutions'** to the global problems of (economic) development and environment. Some people think, we have to reduce all material flows in the industrialized world by 80% (!) to become sustainable. It obviously escaped their attention that several hundred million people in the Third World directly and indirectly live with products and from transfer income produced and generated in the industrial sectors of developed countries[3]. 'On a global basis, official remittances are . . . second in value only to crude oil, [and worth] $71 billion in 1990 . . .'. (Teitelbaum and Russel, 1994, p. 244). 'Closing down' industrialized nations would not only affect their few hundred million inhabitants, but billions of people in the less developed world.

(4) We should be aware that the sustainability concept until now, has mainly been a **social philosophy**, packed with hidden assumptions, values and lifestyle ideals. Popular among sustainability advocates is the Calvinistic 'slow-down' philosophy: we should limit our travelling, our eating of red meat; we should lower the temperature in our apartments and use bicycles instead of cars. This idea of development, however, is *not* shared by a great majority of people – a fact which has to be taken into account. In the United States of America people drove 6710 billion passenger kilometers in 1992/93 (mostly using a car). Only 18% of this individual mobility was necessary to go to work; 44% of all individual mobility in the US was household and family related (such as driving to the shopping mall or taking the kids to school) but 38% (!) was *leisure* mobility – including 55 *billion* kilometers with the objective to 'go for a ride' (which usually means driving up and

[3]The majority of people in Kerala, India and a significant proportion of the population in Bangladesh and Pakistan, for instance, can only survive from the remittances of family members working in the Persian Gulf and Western Europe

down the highway just for the fun of it) (NPTS, 1990; Grubler, 1993).

(5) We should promote economic measures that introduce a **sense of limits**. If people directly feel environmental conditions getting worse and vital life-support systems approaching dangerous conditions, they will hopefully start to think about how to solve these problems and even modify their own behaviour. This learning process, however, will not emerge if we can just avoid being affected by the degraded environment. A good example is the pattern of urban development in many US cities: once, an inner city area becomes 'bad', people and businesses often just move out – wasting valuable land with urban sprawl of suburbs and newly built commercial centres on the periphery instead of fixing the problems in the old inner-city area. Land-use legislation which does not force people to 'clean up' degraded settlements and commercial areas, could contribute to preventing excessive urban land waste. Another example is development aid to poor countries (especially to Africa and Eastern Europe) which often just had the function of 'cleaning up' the economic, social, and environmental mess created by incompetent and corrupt governments. We should not easily provide outside relief from the pressure of environmental degradation. If people and governments realize that there is no 'salvation from outside' (Abernathy, 1993) they will mobilize their creativity and good will. A core problem is the fact that certain environmental resources, such as land, air, water, or the diversity of plant and animal species, often do not have a price. They are essentially free to anyone for exploitation or as a place to dump waste. It certainly makes sense to develop ideas on how these valuable resources can be managed in a better way by implementing pricing and market mechanisms (tradable pollution permits and exploitation rights, etc.). We should not fight advanced economic systems, but use their powerful mechanisms to introduce economic incentives for environmentally more benign products and services.

(6) We should develop methods for **providing the general public with better *direct* access to environmental information.** This could be realized by public information systems based on existing sources of information, such as statistical systems, scientific reports, and mass media. But we could also use more advanced methods. There is no reason, why ordinary citizens should not have direct Internet access to environmental stations and satellites or to monitoring networks of nuclear power plants. It could also include a satellite image or aerial photo of the city's sprawling built up land (to give people a better image of land-use changes in their urban area). The key issue is that all relevant social groups obtain better access to environmental information so that they can participate in processes of decision making.

(7) Whatever we do to promote the bio-geophysical health of the globe we should proceed with **calm reason**, prefer proven economic, political and technological measures and **avoid losing touch with common sense** (Singer *et al.*, 1991; Lindzen, 1990; Michaels and Stooksbury, 1992). We should not jeopardize the actually increasing overall health and prosperity of our species to prevent a mostly hypothesized degradation of life-support systems (Arking, 1996).

The concept of sustainable development is a classical form of deterministic social philosophy which pretends to know in advance the best direction of social, economic and political change. In that it is very similar to the ideology of dialectic materialism, which, in the form of communist development plans has devastated both human and natural resources in Eastern Europe and the former Soviet Union (and, before 1978, China). Today, Russia not only has the most serious environmental destruction, but a miserable economy and by far the lowest life expectancy of all industrialized nations – in fact it is lower than in most developing countries. Experience from recorded history tells us that there is no obviously benign path of human development that would automatically follow from some form of philosophical or scientific enlightenment. Usually

our species had been 'groping in the dark' – trying out various social, economic and political solutions to cope with the dazzling complexity of human relations. But only 'ex post' did we know for sure what worked. This stepwise strategy of development was not necessarily a straight way to disaster. In fact, so far, 'muddling through' was a most successful evolutionary strategy for the human species – and not those grand overall designs for improvement of man–nature relations suggested by supporters of the sustainability concept.

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